

METHODS FOR PROCESSING, OPTIMIZATION, CALIBRATION AND DISPLAY  
OF MEASURED DIELECTROMETRY SIGNALS USING PROPERTY  
ESTIMATION GRIDS

ABSTRACT OF THE DISCLOSURE

5           A method is disclosed for processing, optimization, calibration, and display of  
measured dielectrometry signals. A property estimator is coupled by way of  
instrumentation to an electrode structure and translates sensed electromagnetic  
responses into estimates of one or more preselected properties or dimensions of the  
material, such as dielectric permittivity and ohmic conductivity, layer thickness, or other  
10   physical properties that affect dielectric properties, or presence of other lossy dielectric  
or metallic objects. A dielectrometry sensor is disclosed which can be connected in  
various ways to have different effective penetration depths of electric fields but with all  
configurations having the same air-gap, fluid gap, or shim lift-off height, thereby greatly  
improving the performance of the property estimators by decreasing the number of  
15   unknowns. The sensor geometry consist of a periodic structure with, at any one time, a  
single sensing element that provides for multiple wavelength within the same sensor  
footprint.

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